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Cerebral Dominance and the Superfactors of the Big Five Model in Junior Handball Players

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Abstract

The five superfactors of the Big Five model (Extraversion, Emotional Stability, Conscientiousness, Agreeableness and Autonomy) have been evaluated through the 5 Personality Factors Questionnaire (CP5F Questionnaire), belonging to the computerized platform of psychological evaluation CAS^{++}, elaborated by Cognitrom. A number of 16 female handball players aged between 14-15 years, from C.S.S. 6 Bucharest have participated in this study. Using the Spearman correlation, we have highlighted important relations between rationality (upper left quadrant) and the results obtained by the athletes for the Emotional Stability Scale and Autonomy Scale.

Keywords: cerebral dominance, upper left quadrant, emotional stability, autonomy, handball;

1. Introduction

Our personality represents a complex and dynamic reality for each and every one of us. It is complex because it includes extremely different and varied components, such as anatomical-physiological, psychological and social-cultural components. It is dynamic because it is not a fixed mix of components (despite the quite stable mix of features it includes), and it undergoes a certain development in time, in the ontogenetic-individual plane (Zlate, 2000). The personality represents the essential feature of the psychological life of a human being, as a product and producer of circumstances, deemed to be a bio-psychic-social-cultural unit and a holder of epistemic, axiological and pragmatic functions (Horghidan, Mitrache and Tüdös, 2001). There is evidence that extroverted people tend to exhibit significantly more right hemisphere EEG patterns than introverted subjects (Lavach, 1991). Cerebral preference refers to the dominancy of a certain cerebral quadrant. According to the specialized literature

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(Tanner, 1997), the brain is composed of four interactive quadrants – the upper left quadrant, the lower left quadrant, the lower right quadrant and the upper right quadrant. Taken together, these four specialized parts form the "whole brain" (Herrmann, 1991), which profiles a person's thinking and behaviour. For most people, the upper left quadrant is better at performing analytical, logical and mathematical activities and tasks. In other words, the upper left brain can solve problems through reasoning and logic. In contrast, the upper right brain is better at imaginative, intuitive and risky activities and tasks. Also, the upper right quadrant operates outside the norm, gets flashes of ideas and solves problems on the basis of feelings and hunches. The lower left quadrant of the brain processes structured, sequential and organized mental activities. Emotional and interpersonal mental activities occur in the lower right quadrant. For most people there is a brain dominance condition in which the quadrants work together, but one or two of the quadrants take the lead. Each specialized mode has its own language, perceptions and ways of knowing and being. As a result of proper training, the different categories of preferences - the upper left, lower left, lower right and upper right brain - can be modified (Roco, 2004). Experts generally agree that utilizing the whole rather than half of the brain is certainly more promising for patterning the brain for later retrieval and use of information. The future of teaching and learning lies in the study of the brain (Mannies, 1986).

2. Organization of the research

2.1. Scope

This study aims at identifying the correlations existing between the four quadrants of the brain - the upper left, lower left, lower right and upper right quadrant and the five superfactors of the Big Five model (Extraversion, Emotional Stability, Conscientiousness, Agreeableness and Autonomy) in junior handball players.

2.2. Subjects

A number of 16 female handball players aged between 14-15 years, from C.S.S. 6 Bucharest have participated in this study. They represent the junior III team which participates in the Romanian National Handball Championship, 2012-2013 edition.

2.3. Methods

For solving our research issues, we used observation, conversation, questionnaires – The Actional Preferences Questionnaire (*adapted* by Roco *after* Chalvin and Herrmann, 1992) and the CP5F Questionnaire, belonging to the computerized platform of psychological evaluation CAS^{++}, elaborated by Cognitrom.

The Actional Preferences Questionnaire requires subjects to answer 72 questions, in relation to their own manner of thinking and acting. There are 5 possible answers in the Five Factor Personality Questionnaire (CP5F): very little, little, moderate, much, very much. The Five Factor Personality Questionnaire (CP5F) is intended to measure the five Big Five Model superfactors (Extraversion, Emotional Stability, Conscientiousness, Agreeableness and Autonomy). CP5F contains six scales, five for each superfactor (whose name corresponds to the name of the superfactor it measures) and one scale, called Social Desirability, for identifying persons whose answers are not compliant with reality, either because such persons aim to create a favourable image about themselves, or because they answer without taking into consideration the truth or aiming to show themselves as being different from other people. Each item in the CP5F contains a statement on the way a person feels, thinks or acts. The subjects must consider the extent to which the statement concerning each item fit them and must answer by selecting one of the following alternatives: "1 = it fits me very little", "2 = it fits me a little", "3 = it fits me halfway", "4 = it fits me much" and "5 = it fits me very much". The Extraversion scale measures the

pleasure the subjects find in interacting with others or their preference for solitary activities. The Agreeableness scale joins items referring to the observance of the opinions of others and the observance of the rights of others. It shows whether the subjects express interest for people around them or interest only for themselves, disturbing the people around. The Consciousness scale describes the susceptibility for complying with the rules and standards and for being methodical. It also offers information on subjects who begin to act without thinking about the purpose of their actions and whose actions are not executed within the determined terms. The Autonomy scale items measure the need to act in different way than the others. The subjects do not accept to be led by others or, on the contrary, they accept anything they are told, and therefore can be easily manipulated. The Emotional Stability scale identifies the participants who are the most optimistic, who think positively and trust their own abilities, as well as the subjects who are always anxious, pessimistic, and have a poor control over their emotions.

3. Results

Our preliminary data analysis (box-plot chart) emphasized the fact that in the case of the CP5F questionnaire scales - Extraversion, Emotional Stability, Conscientiousness, Agreeableness and Autonomy, and for the results obtained for the cerebral preferences - upper left quadrant, lower left quadrant, lower right and upper right quadrant (The Actional Preferences Questionnaire), there were no excessive – marginal and extreme – values. We present as an example the box-plot for Emotional Stability and Autonomy (see Fig. 1).

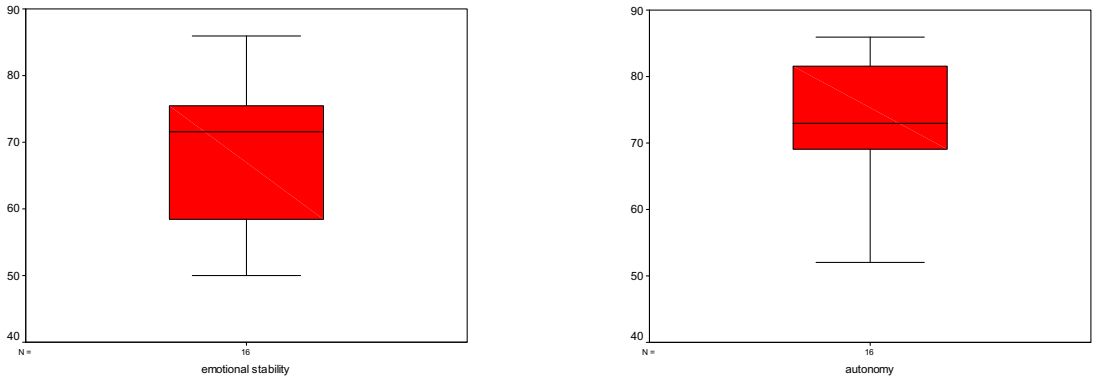

Fig. 1. Extreme values (a) emotional stability; (b) autonomy

Using the Spearman correlation, we checked whether there were any relations between the scores for Extraversion, Emotional Stability, Conscientiousness, Agreeableness and Autonomy and the results obtained by the athletes for the cerebral preferences - upper left, lower left, lower right and upper right quadrant of the brain.

The following conditions for the application of the Spearman correlation are fulfilled [8]:

- Both variables are ordinal or one of the variables is quantitative and the other ordinal;
- The sample is limited in volume (16 subjects);
- The scores for a variable are monotonously related to the scores of the other variable, meaning that, once the values of a variable grow (decrease), the values of the other variable will also grow (decrease) – but not necessarily in a linear manner.

Tables 1 and 2 below present the correlations between the scores for the Emotional Stability scale, the Autonomy scale and the results obtained by the athletes for cerebral preferences - upper left, lower left, lower right and upper right quadrant of the brain.

Table 1. Results for the Emotional Stability scale and for cerebral preferences - upper left, lower left, lower right and upper right quadrant of the brain

Variables	N	m	s	Emotional Stability scale	
				Spearman's rho Correlation Coefficient	p
Emotional Stability scale	16	67.88	10.40	1.000	.
upper left	16	65.56	8.43	0.557*	0.025
lower left	16	69.81	8.32	0.270	0.311
lower right	16	73.25	6.62	0.338	0.201
upper right	16	68.56	8.72	0.380	0.147

**. Correlation is significant at the .01 level (2-tailed).
*. Correlation is significant at the .05 level (2-tailed).

The analysis of the results indicated in Table 1 has revealed the following:

- There is a positively significant correlation (0.557) between emotional stability and the results obtained by the athletes for the upper left quadrant of the brain ($p < 0.05$);
- As for correlation, a proper indicator for the effect size index is the determination coefficient (r^2) whose value is 0.31. We can say that 31% of the variation (spread) of one of the two variables is determined by the variation of the other or, in other words, 31% of the variation of the two variables is common, the rest being due to other influences. This means that the relation between emotional stability and the results of the junior handball players for the upper left brain is moderate.
- There is no correlation between emotional stability and the results obtained by the athletes for the lower left quadrant of the brain ($p < 0,05$);
- There is no correlation between emotional stability and the results obtained by the athletes for the lower right quadrant of the brain ($p < 0,05$);
- There is no correlation between emotional stability and the results obtained by the athletes for the upper right quadrant of the brain ($p < 0,05$).

Table 2. Results for the Autonomy scale and for cerebral preferences - upper left, lower left, lower right and upper right quadrant of the brain

Variables	N	m	s	Autonomy scale	
				Spearman's rho Correlation Coefficient	p

Autonomy scale	16	72.44	10.65	1.000	
upper left	16	65.56	8.43	0.534*	0.033
lower left	16	69.81	8.32	0.162	0.548
lower right	16	73.25	6.62	0.279	0.296
upper right	16	68.56	8.72	0.235	0.381

**. Correlation is significant at the .01 level (2-tailed).
*. Correlation is significant at the .05 level (2-tailed).

The analysis of the results indicated in table number 2 has revealed the following:

- There is a positively significant correlation (0.534) between the scores on the Autonomy scale and the results obtained by the athletes for the upper left quadrant of the brain ($p < 0.05$);
- The determination coefficient (r^2) has a 0.29 value, meaning that the relation between autonomy and the results of the junior handball players for the upper left brain is moderate.
- There is no correlation between autonomy and the results obtained by the athletes for the lower left quadrant of the brain ($p < 0.05$);
- There is no correlation between autonomy and the results obtained by the athletes for the lower right quadrant of the brain ($p < 0.05$);
- There is no correlation between autonomy and the results obtained by the athletes for the upper right quadrant of the brain ($p < 0.05$).

4. Conclusions

This study demonstrates the existence of several significant statistic correlations between the results obtained by the athletes for cerebral preferences - upper left, lower left, lower right and upper right quadrant of the brain and the five superfactors of the Big Five model - Extraversion, Emotional Stability, Conscientiousness, Agreeableness and Autonomy. The results obtained show that there is a positively significant correlation between emotional stability and the results obtained by the junior handball players for the upper left quadrant of the brain. There is also a positively significant correlation between autonomy and the results obtained by the female athletes for the upper left brain. With respect to the effect size index (the determination coefficient r^2 has a 0.31 value) we have found that the relation between emotional stability and the results of the junior handball players for the upper left brain is moderate. Also, the determination coefficient r^2 has a 0.29 value, which means that the relation between autonomy and the results of the female athletes for the upper left quadrant of the brain is moderate. When talking about the following superfactors of the Big Five model: Extraversion, Conscientiousness and Agreeableness, we have found that there is no significant statistical relation with the results obtained by the female athletes for the four interactive quadrants of the brain - upper left, lower left, lower right and upper right quadrant. Our research has been limited by the physical and mental states of the subjects during testing (fatigue, affective-motivational factors) which may cause variations in the answers. Observation and conversation as research methods support the value of our research, which is based on the study of the five superfactors in the Big Five model and the four interactive quadrants of the brain. Another limitation is represented by the sample of athletes. The situation could have been different if the sample had included, for instance, only male athletes or if we had investigated more than 16 subjects. Given the fact that the specific domain references only analyze in a poor manner the aspects that we were interested in, this paper can be considered as a starting point for further in-depth research and a topic for reflection for specialists. The Actional Preferences Questionnaire and the Five Personality Factors Questionnaire (CP5F) may be used as complementary means for psychological preparation, they may offer data with respect to the various dimensions of the personality and to the dominant cerebral

quadrants, being aware of the fact that the future of teaching and learning lies in the study of the "whole brain". Based on the results obtained by the junior handball players we emphasize the importance of activating the upper left quadrant of the brain – through proper training – which may lead to better control over emotions and to a higher level of autonomy in thinking and behaviour.

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